Quadratic Functions
Section 3.1

Learning Objectives:

1. Recognize characteristics of parabolas.
2. Graph parabolas.
3. Determine a quadratic function's minimum or maximum value.
4. Solve problems involving a quadratic function's minimum or maximum value.

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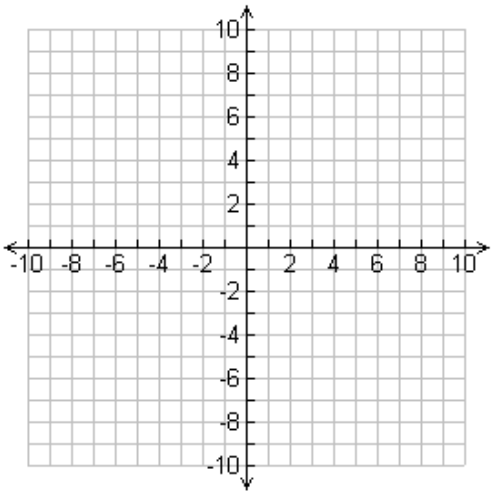
1. Use the vertex and intercepts to sketch the graph of the quadratic function. Give the equation of the parabolas axis of symmetry. Use the graph to determine the domain and range of the function.

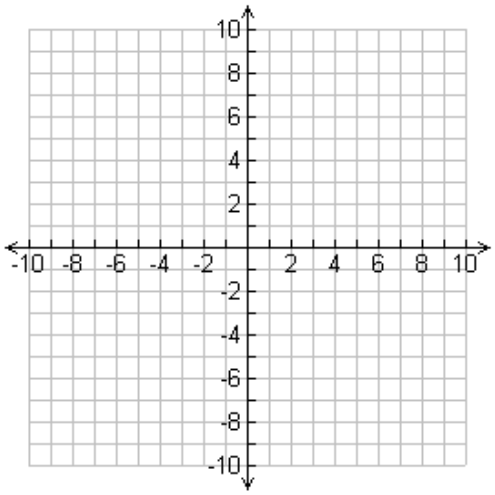
$$f(x) = (x+2)^2 - 9$$



a. The axis of symmetry is x=_____.
b. The domain of the function is _____.
c. The range of the function is _____.

2. Use the vertex and intercepts to sketch the graph of the quadratic function. Give the equation of the parabolas axis of symmetry. Use the graph to determine the domain and range of the function.

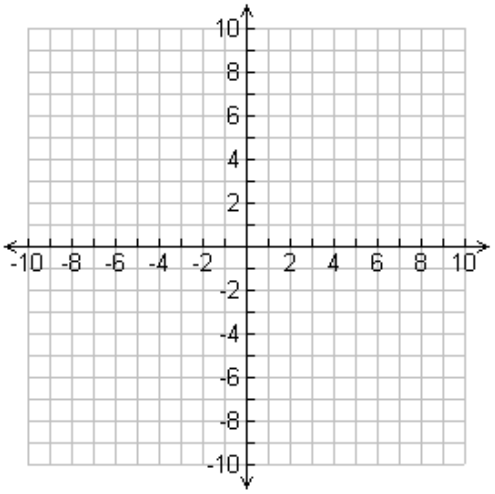
$$f(x) = (x-2)^2 + 5$$



a. The axis of symmetry is x=_____.
b. The domain of the function is _____.
c. The range of the function is _____.

3. Use the vertex and intercepts to sketch the graph of the quadratic function. Give the equation of the parabolas axis of symmetry. Use the graph to determine the domain and range of the function.

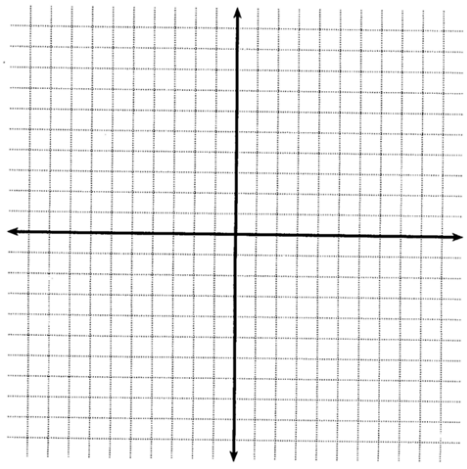
$$f(x) = x^2 + 2x - 8$$



a. The axis of symmetry is x=_____.
b. The domain of the function is _____.
c. The range of the function is _____.

4. Use the vertex and intercepts to sketch the graph of the quadratic function. Give the equation of the parabolas axis of symmetry. Use the graph to determine the domain and range of the function.

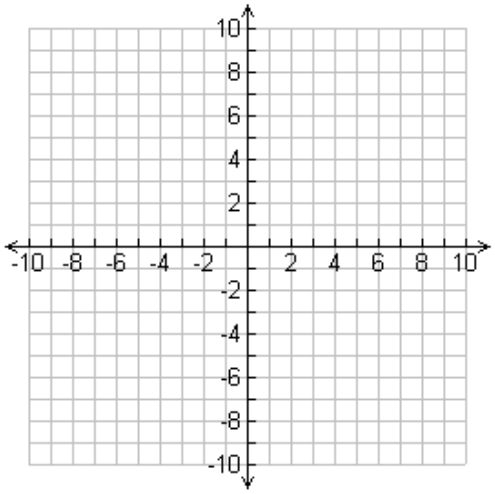
$$f(x) = 2x - x^2 + 15$$



a. The axis of symmetry is x=_____.
b. The domain of the function is _____.
c. The range of the function is _____.

5. Use the vertex and intercepts to sketch the graph of the quadratic function. Give the equation of the parabolas axis of symmetry. Use the graph to determine the domain and range of the function.

$$f(x) = 4x - x^2 - 5$$

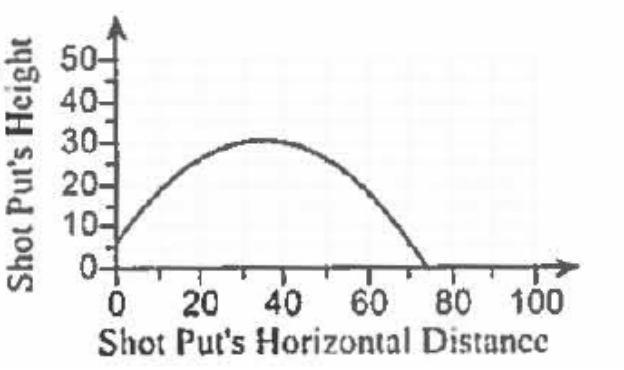


a. The axis of symmetry is x=_____.
b. The domain of the function is _____.
c. The range of the function is _____.

6. Consider the function $f(x) = 2x^2 - 20x - 8$.
   a. Does the function have a Maximum or Minimum value?
      _____
   b. The minimum/maximum value is _____. It occurs at x=_____.
   c. The domain of f is _____.
   d. The range of f is _____.

7. Consider the function $f(x) = -3x^2 + 30x - 8$.
   a. Does the function have a Maximum or Minimum value?
      _____
   b. The minimum/maximum value is _____. It occurs at x=_____.
   c. The domain of f is _____.
   d. The range of f is _____.

8. An athlete whose event is the shot put releases a shot. When the shot whose path is shown by the graph to the right is released at an angle of 55°, its height, f(x) , in feet, can be modeled by $f(x) = -0.02x^2 + 1.4x + 6.1$, where x is the shot's horizontal distance, in feet, from its point of release. Use this model to solve parts (a) through (c) and verify your answers using the graph.

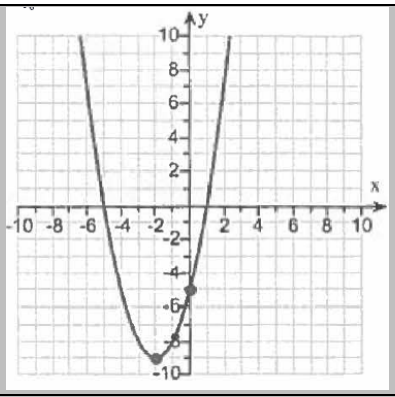
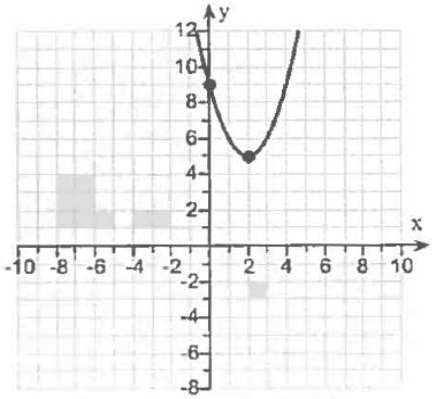
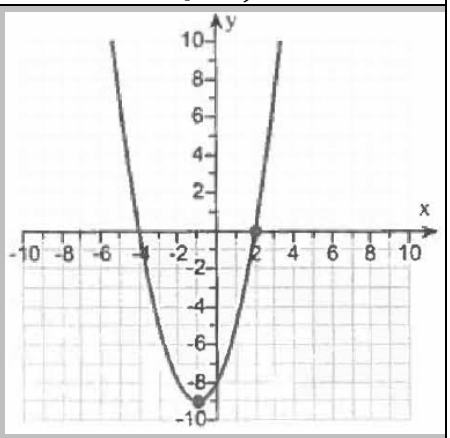


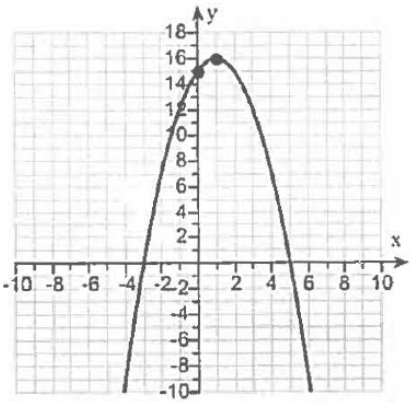
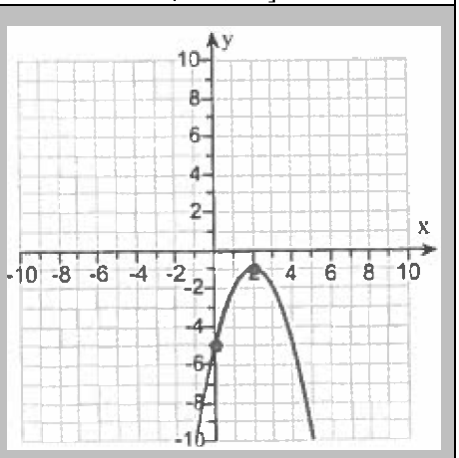
What is the maximum height of the shot and how far from its point of release does this occur?

a. The maximum height is_____ , which occurs _____ feet from the point of release.(Type an integer or decimal rounded to four decimal places as needed.)
b. What is the shot's maximum horizontal distance, to the nearest tenth of a foot, or the distance of the throw?
_____ feet
(Type an integer or decimal rounded to four decimal places as needed.)

c. From what height was the shot released?
_____ feet
(Type an integer or decimal rounded to four decimal places as needed.)

Answer Key:

1.	Graph	
	a.	$x = -2$
	b.	$(-\infty, \infty)$
	c.	$[-9, \infty)$
2.	Graph	
	a.	$x = 2$
	b.	$(-\infty, \infty)$
	c.	$[5, \infty)$
3.	Graph	
	a.	$x = -1$
	b.	$(-\infty, \infty)$
	c.	$[-9, \infty)$

4.	Graph	
	a.	$x = 1$
	b.	$(-\infty, \infty)$
	c.	$(-\infty, 16]$
5.	Graph	
	a.	$x = 2$
	b.	$(-\infty, \infty)$
	c.	$(-\infty, -1]$
6.	a.	Minimum
	b.	-58,5
	c.	$(-\infty, \infty)$
	d.	$[-58, \infty)$
7.	a.	Maximum
	b.	67,5
	c.	$(-\infty, \infty)$
	d.	$(-\infty, 67]$
8.	a.	30.6000
	b.	35
	c.	74.1
	d.	6.1